IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Christopher Parks

EXTENDED DYNAMIC RANGE
IMAGE SENSOR WITH FIXED
PATTERN NOISE REDUCTION

Serial No. 10/809,073

Filed 25 March 2004

Group Art Unit 2622
Confirmation No. 6988
Examiner Wang, Kent F.

Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

Pre-Appeal Brief Request For Review

Applicant requests a review of the final rejection in the above-identified application. No amendments are being filed with this request. The request is being filed with a Notice of Appeal.

This review is requested for the reasons stated in the attached pages.

Claims 10, 12, 14, 15, 17, and 19-22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Komiya (US 5,335,075). Claims 16 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Komiya in view of Juen (US 5,341,220).

102(b) Rejection

In order for a reference to anticipate an invention, each and every element of the claimed invention must be found in a single reference. "The identical invention must be shown in as complete detail as is contained in the ... claim." MPEP § 2131. Applicant respectfully submits Komiya does not teach each and every element in Applicant's claims.

Applicant's independent claim 10 recites "a charge control structure used to change charge capacity during an integration time." Independent claim 19 states "changing the charge capacity of each pixel throughout the integration time." As described on page 7 of Applicant's specification, the charge capacity of a photodiode is controlled by a voltage applied to the substrate. In one embodiment in accordance with the invention, the charge capacity is adjusted from 20,000 electrons or less when the substrate voltage is 14 volts to 40,000 electrons or less when the substrate voltage is 9 volts (see lines 4-20 on page 7).

The Examiner argues on page 2 of the Final Office Action that Komiya discloses an image sensor having "a charge control structure (condition setting circuit 64, Fig 20) used to change charge capacity during an integration time (col. 12, lines 27-54)." Lines 44 through 54 in column 12 state:

> "The condition setting circuit 64 judges whether or not the maximum value Lh is saturated, and shortens the exposure time T or makes the diaphragm opening wider when it is saturated. When the maximum value Lh is not saturated, the exposure time T is made longer or the diaphragm opening narrower. This action is performed each time the signal is read from the CMD 39. Because the signal is read at a high speed from the CMD 39 to be adjusted to expression (16), the time required for the adjustment is extremely short: The maximum value of the signal ≈ the saturated value (16).

It is clear from the description above that Komiya teaches varying either the exposure time T or the diaphragm opening based on whether the maximum value Lh is saturated or not. But nothing found in Komiya discloses changing the

charge capacity of a pixel during an integration time. Therefore, for at least this reason, Komiya does not anticipate Applicant's independent claims 10 and 19.

Applicant's independent claim 10 further recites, "the charge capacity is changed by the charge control structure throughout the integration time such that substantially no portion of the pixel photo response curve is substantially linear." Independent claim 19 states, "changing the charge capacity of each pixel throughout the integration time such that substantially no portion of the pixel photo response curve is substantially linear." One example of a substantially non-linear pixel photo response curve produced by an embodiment in accordance with Applicant's invention is depicted in Applicant's Figure 15 (Curve C).

The Examiner argues Komiya discloses a nonlinear pixel photo response curve in lines 21-41 in column 15, and in the accumulation data represented by F_0 in Figure 22. Figure 22 illustrates data accumulated at the accumulator (56) when five readouts are performed during one exposure period. The amount of light read out is represented on the horizontal axis, and the light obtained at the five readouts is identified as L_1 through L_5. Since the five readouts occur during one exposure period (without any resets), the data accumulates between readout times as shown in Figure 21. Thus, as shown in Figure 22, the portions of F_0 between L_1 and L_2, L_2 and L_3, L_3 and L_4, and L_4 and L_5 are each linear or substantially linear. F_0, however, is not linear in its entirety. Komiya then coverts the data represented by F_0 to the linear (linear in its entirety) data of F_1 (see lines 36-41 in column 15).

Applicant submits that since portions of F_0 are linear or substantially linear, Komiya does not teach or suggest changing the charge capacity of each pixel "throughout the integration time such that substantially *no portion of the pixel photo response* curve is substantially linear." Therefore, for at least this reason, Komiya does not anticipate Applicant's independent claims 10 and 19.

And finally, Applicant's independent claim 10 recites "means for multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal." Independent claim 19 states "multiplying each pixel by a constant value determined for that pixel to compensate for variations of

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the charge capacity such that all pixel photo response curves are substantially equal." The Examiner argues Komiya teaches this aspect of the claimed invention in the conversion of F_0 to F_1 (as shown in Figure 22). Both F_0 and F_1, however, represent the image signal read from the image sensor (CMD 39) (see Figure 20 and lines 37-40). Thus, the data in F_0 and F_1 are obtained from all of the photosensitive sites in the CMD. Nothing found in Komiya teaches "means for multiplying *each pixel by a constant value determined for that pixel* to compensate for variations of the charge capacity such that *all pixel photo response curves are substantially equal.*" Therefore, for at least this reason, Komiya does not anticipate Applicant's independent claims 10 and 19.

"Claims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim." 37 CFR § 1.75. Claims 12, 14, 15, and 17 depend from and include all of the limitations of independent claim 10 while claims 20-22 depend from and include all of the limitations of independent claim 19. For at least the reasons discussed above, Komiya does not anticipate independent claims 10 and 19. Accordingly, dependent claims 12, 14, 15, 17, and 20-22 are also not anticipated by Komiya.

103(a) Rejection

The Manual of Patent Examining Procedure states the following in Section 2143:

> "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations."

Applicant submits the combinations of Komiya and Juen do not render Applicant's claims 16 and 18 obvious because the combination does not meet the three basic criteria. The argument below, however, will focus on the third criterion.
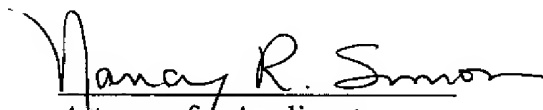
Applicant's arugments with respect to Komiya apply to this rejection as well. And Juen does not make up for the deficiencies of Komiya. Neither Komiya nor Juen teach or suggest *changing the charge capacity* of each pixel

"throughout the integration time such that substantially *no portion of the pixel photo response* curve is substantially linear," and "multiplying *each pixel by a constant value determined for that pixel* to compensate for variations of the charge capacity such that *all pixel photo response curves are substantially equal*." Therefore, for at least the following reasons, the combination of <u>Komiya</u> and <u>Juen</u> does not render Applicant's independent claims 10 and 19 obvious because the combination does not teach or suggest all of the claim limitations.

Claims 16 and 18 depend from independent claim 10. "If an independent claim is not rendered obvious by prior art, then any claim depending from the independent claim is not obvious." In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1988) (see also M.P.E.P. § 2143.03). Since the combination of <u>Komiya</u> and <u>Juen</u> does not render independent claim 10 obvious, dependent claims 16 and 18 are also not obvious in view of <u>Komiya</u> and <u>Juen</u>.

In light of the above remarks, Applicant respectfully requests the rejections under 35 U.S.C. § 102(b) and 103(a) be reversed and claims 10, 12, and 14-22 be allowed.

Respectfully submitted,

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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.